INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Algorithm and Programming			Field of study	Computer Science		
Bachelor in	Management Informatics			School	School of Technology and Management		
Academic Year	2023/2024	Year of study	1	Level	1-1	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9186-709-1102-00-23		

Workload (hours)	162	Contact hours	T	TP	PL	TC	S	E	OT	O
			30	-	30	-	-	-	-	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Luís Manuel Alves, Luis Carlos Marques Afonso

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Develop a structured thinking that allows to design an algorithm and implement it in the Java programming language, for computational problems of medium complexity;
2. Apply basic knowledge of programming in Java;
3. Analyze and explain the behavior of programs written in Java;
4. Modify and evolve programs written in Java;
5. Design, implement, test and debug programs written in Java.

Prerequisites

Before the course unit the learner is expected to be able to:
Not applicable.

Course contents

Concept of algorithm; introduction to the Integrated Development Environment (IDE); installation and configuration of the IDE; data types; variables and constants; data input and output; operators and expressions; conditional and loop flow structures; methods and parameters; arrays and strings; files.

Course contents (extended version)

1. Basics on algorithms:
   - algorithm concept;
   - development of a program;
   - algorithmic notation;
   - design of an algorithm.
2. Introduction to the Java programming language:
   - installation of the Integrated Development Environment (IDE);
   - structure of a Java program;
   - editing, compiling and running a Java program.
3. Elementary data types:
   - data types, declaration of variables;
   - concept of constant, definition of constants;
   - reserved words in Java;
   - statements to read and write in the console.
4. Testing and conditions:
   - concept of expression, literal and operator;
   - arithmetic, relational and logical operators;
   - assignment operator and type conversions;
   - the If and Switch statements.
5. Loops:
   - the While statement;
   - the Do-while statement;
   - the For statement.
6. Methods:
   - concept of method and structure of a Java method;
   - parameters passed by value;
   - local/global, internal/external and automatic/static variables.
7. Vectors:
   - declaration and automatic initialization of vectors;
   - passing vectors to a mehod;
   - processing of vectors;
   - multi-dimensional arrays.
8. Strings:
   - main methods for string manipulation;
   - development of specific methods for string manipulation.
9. Files:
   - concept of file, peripherals and streams;
   - InPutStream and OutPutStream streams;
   - FileInputStream and FileOutputStream classes;
   - detection of end of file.

Recommended reading

1. Pedro Coelho, “Programação em Java”, Curso Completo, FCA, 2016.
2. F. Mário Martins, “Java 8 – Poo + Construções Funcionais”, Tecnologias de Informação, FCA, 2017.
3. António J. Mendes, Maria J. Marcelino, “Fundamentos de Programação em Java”, Tecnologias de Informação, FCA, 2012.
4. Paul Deitel, Harvey Deitel, “Java Como Programar”, 10ª Ed. , Pearson, 2017.
5. Herbert Schildt, “Java the Complete Reference”, 11th Ed. , McGraw-Hill Education, 2019.

Teaching and learning methods

The teaching method used in lecture classes is the expository method, which makes possible the transmission of knowledge in a continuous and less time consuming manner. Practical classes are mostly based on the active method, enhancing the activity of students through the resolution of practical exercises. Students are also required to perform practical assignments outside the classes.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 30%
   - Intermediate Written Test - 30%
   - Intermediate Written Test - 40% (To be held in the Final Evaluation Period.)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Luís Manuel Alves	Tiago Miguel Ferreira Guimaraes Pedrosa	José Carlos Rufino Amaro	Nuno Adriano Baptista Ribeiro
09-10-2023	25-10-2023	31-10-2023	06-11-2023